15-16

Crane Loads on Structures While Under Contract Administration

July 25, 1969

MEMO TO DESIGNERS:

Section 7-1.02 of the 1969 Standard Specifications allows the operation of construction equipment on bridge decks. There is, in addition, a standard special provision that allows construction equipment which exceeds size and weight limitations of Section 7-1.02, provided the structure is designed for the increased loads.

Requests for structural approval for permission to drive cranes which exceed the loads permitted in the above references across a structure, or to operate the cranes from a structure, shall be submitted through the Bridge Construction Department, and shall be handled as follows:

(A) Single Cranes Travelling Across Structures

Bridge Construction Department will handle except in those cases where the load exceeds "Purple Loading." When the loads exceed "Purple Loading", Construction will refer the request to the design section involved which will check for compliance with Memo to Designers 15-15.

(B) Single Cranes Operating from Structures

The review will be made by the design section involved, and the results of that review will be routed through the "Construction Overloads" Committee before transmittal to the construction department. Calculations should also be sent to the committee. The intent of routing through the "Construction Overloads" Committee is solely for the purpose of guaranteeing uniformity in administration of these requests. Since time is important on a construction contract, these requests should be expedited.

The following general rules should be observed:

(1) All crane loads shall be transmitted through the outriggers on the lift side of the crane. This provision sets the load limit without close field supervision.

(2) All loads shall be transferred to the structure through the girder lines by outriggers or temporary transverse beams (see sketches). These beams must be blocked clear of the deck, but their design would not normally be a part of this review.

(3) All outriggers shall be set on timber blocking to protect the deck and to aid in distribution.

(4) Impact loading for the crane shall be assumed equal to that used in design.

The attached sample calculations illustrate methods of checking girder loads. Note that, for comparison, the HS20-44 loading has been modified to equivalent 2-axle or single axle loadings. These are rough approximations and are based on considering the span lengths involved. Some rough approximations of these loadings are shown below.

Approximate Equivalent HS20-44 Loadings

A. For 2-Axles the equivalent value would be between $64^k$ and $72^k$. Use $68^k$ for all span lengths.

B. For point load the equivalent value can vary from $48^k$ (Alt Load) to $72^k$ (Full Truck). The following approximations are conservative:

| Span | P |
|---|---|
| Less than 60' | $50^k$ |
| 60' to less than 160' | $60^k$ |
| Over 160' | $70^k$ |

Such comparison greatly simplifies the review, but in some cases it may be necessary to run a more comprehensive analysis. This could be very time consuming and the general "eyeball" approach should be used whenever it can be shown to be conservative.

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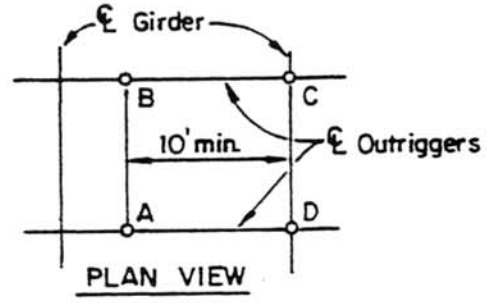
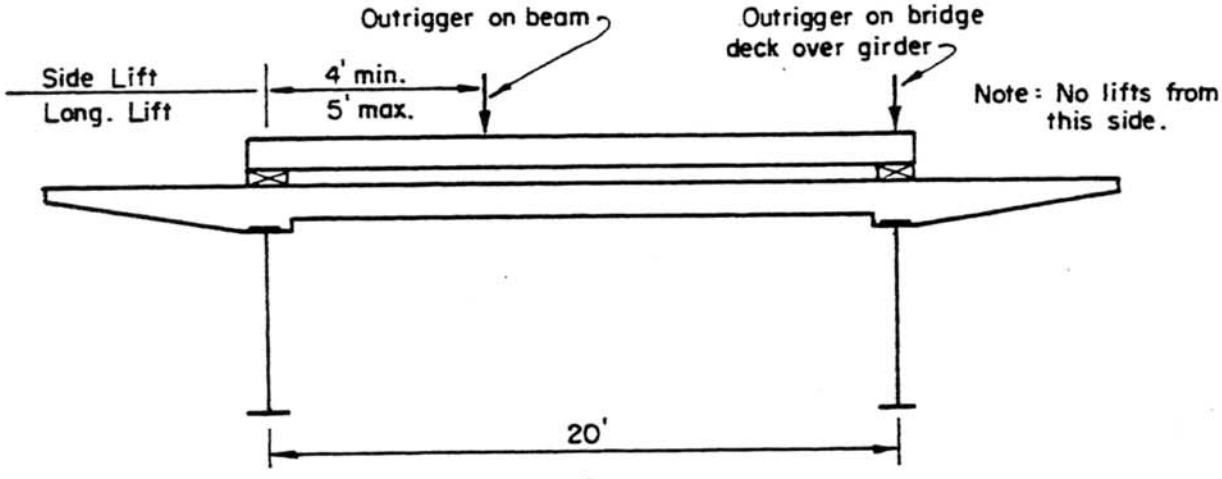
Attach.
JER:ap

This example is for a specific request for a specific structure. Notes and assumptions pertain to that structure only and are not necessarily policy.




CRANE LOADS

| | |
|---|---|
| Crane | 95 kips |
| Max. Lift | 10 kips |
| Total | 105 kips |




Transverse Lift (1/2 load acting at A and B)

Total Load = 16/20 x (105/2)2 = $84^k$

Design = 1.3 lanes x *$68^k \pm$ = $88^k$ OK----------

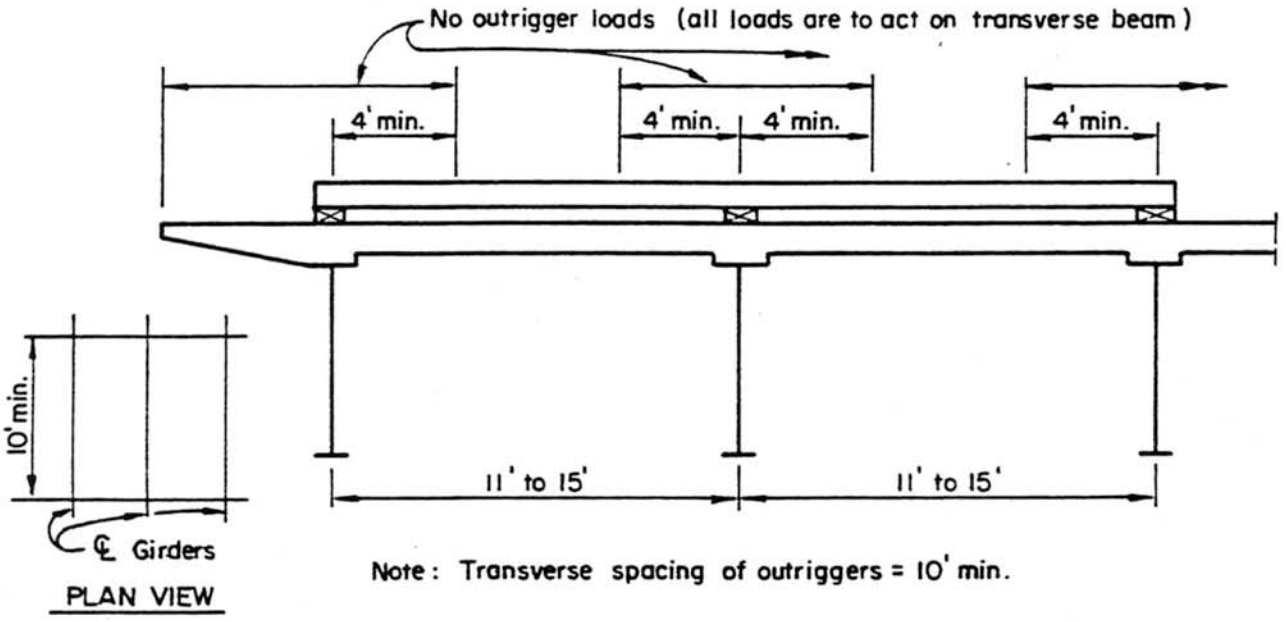
Longitudinal Lift (point loading on girder, 1/2 load acting at A and D)

Total Load = (105 x 1/2) (1 + 5/20) = $66^k$

Design = 1.3 lanes x **$55^k \pm$ = $72^k$ OK----------

* Rough approximation of the equivalent 2-axle loading at 14' of HS20-44.

** Rough approximation of the equivalent single axle loading of HS20-44.




Note: Transverse spacing of outriggers = 10' min.

Transverse Lift (1/2 acting at each outrigger on girder)

Girder Spacing = 11'

Total Load = $7/11 \times 105^{k} = 67^{k}$

Design = $11/11 \times *68^{k} = 68^{k}$ OK----

Girder Spacing = 15'

Total Load = $11/15 \times 105^{k} = 77^{k}$

Design = $15/11 \times *68^{k} = 93^{k}$ OK----

Longitudinal Lift (point loading on girder)

Girder Spacing = 11'

Total Load = $2 \times 6/11 \times 105^{k}/2 = 57^{k}$

Design = $11/11 \times **55^{k} = 55^{k}$ Acceptably Close

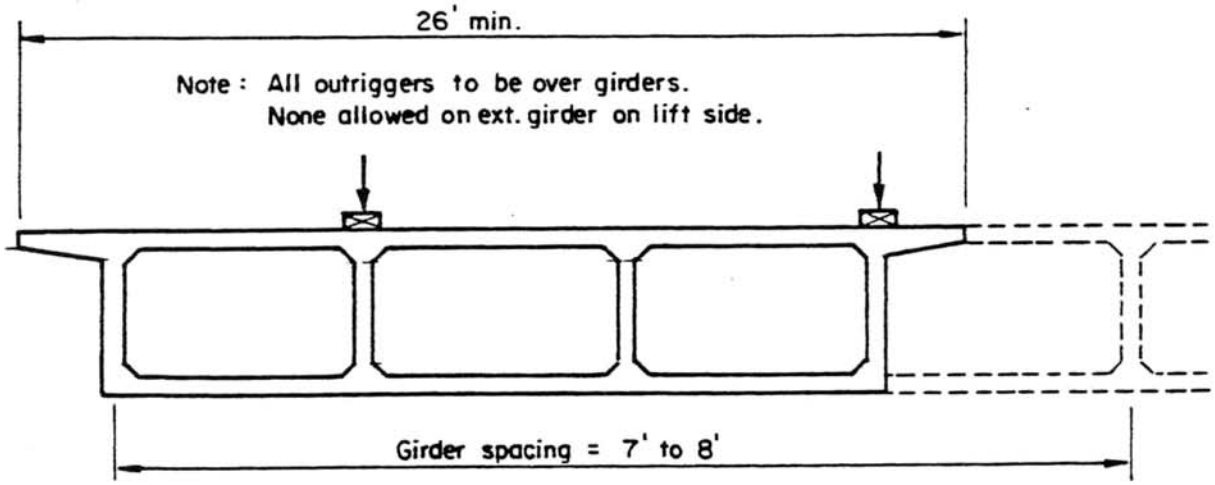
Girder Spacing = 15'

Total Load = $2 \times 10/15 \times 105^{k}/2 = 70^{k}$ per girder

Design = $15/11 \times **55^{k} = 75^{k}$ per girder OK----

*) See sheet 2 of 5

**)




Assuming 50% participation by left ext. girder.

Transverse Lift (1/2 acting at each outrigger on girder)

Total Load = $105^{k}/3.5 = 30^{k}$

Design = $26/14 \times *68^{k}/4 = 32^{k}$ OK----

Longitudinal Lift (point loading on girder)

Total Lift = $105^{k}/3.5 = 30^{k}$

Design = $26/14 \times *55^{k}/4 = 26^{k}$ Acceptably Close

*) See sheet 2 of 5
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